

**TECHNICAL RESCUE ASSESSMENT
OF THE
NORTH PROVIDENCE FIRE DEPARTMENT**

EXECUTIVE DEVELOPMENT

BY: Jack D. Lane, Jr.
Battalion Chief
North Providence Fire Department
North Providence, Rhode Island

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ABSTRACT

The growing potential for technical rescue incidents prompted the North Providence Fire Department to begin training for this type of emergency. The problem that initiated this research was that changes in senior executive personnel along with fluctuating levels of fire department funding have affected the operational capabilities of the department in the field of technical rescue.

The purpose of this research is to evaluate the existing technical rescue capabilities and propose recommendations to correct identified deficiencies. The evaluative research method was used. Listed below are the research questions answered:

1. Is the North Providence Fire Department allocating sufficient funds to cover training costs and equipment purchases?
2. Does the North Providence Fire Department have the type of equipment necessary to conduct technical rescue operations?
3. Have North Providence Fire Department personnel received the training required to perform technical rescue operations?
4. Does the North Providence Fire Department conduct re-certification training to maintain skill levels?

The literature review located recommended national standards for training and equipping technical rescue teams. A survey was completed to identify which technical rescue courses each department member had completed. Comparisons were made between the department's current inventory with the nationally recommended equipment a department is to have on hand for technical rescue incidents.

This research has shown that now the North Providence Fire Department has the training and equipment to operate at a first responder awareness level. The lack of training and specialized equipment would make it dangerous to operate at a higher level.

Recommendations include interim measures that would provide needed refresher training and a rapid personnel recall list to provide proper staffing for technical rescue emergencies. In addition, long term measures to improve capabilities were proposed.

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INTRODUCTION

The North Providence Fire Department (NPFDD) responds to between five and six thousand fire and Emergency Medical Service (EMS) incidents a year. At any given time, one of these emergencies may require the NPFDD to conduct a technical rescue operation. The forces of nature such as hurricanes, tornadoes, earthquakes, and floods often require technical rescues in their aftermath. Terrorism and man made disasters are also a problem. It becomes imperative that the NPFDD is prepared to respond to complex rescues such as structural collapses, confined spaces, swift water currents, and persons trapped in buildings or below ground level.

In response to the potential for a technical rescue emergency, the NPFDD proactively started a limited training curriculum in 1991 (North Providence Fire Department Training Records). This training program consisted of hazardous materials (Haz-Mat) awareness and operational levels for both fire and EMS personnel. In 1995, training expanded to include confined space awareness levels. Several joint training sessions were conducted with Special Hazards 1, the heavy rescue unit of the Providence Fire Department. Additionally, some NPFDD members attended at their own expense, various courses certified by either governmental or private contract agencies, in an effort to achieve a higher level of competency.

NPFDD'S inventory had a limited number of specialized rescue tools and equipment. Initially, the NPFDD approached the shortage by constructing some of the needed resources from locally procured materials. The local hospital, St. Joseph's, Our Lady of Fatima unit, donated (over the course of several years) a dedicated haul system and rope rescue equipment. Providence Journal Company donated a newspaper delivery truck that was refurbished, and placed into service as Special Services One (SS1), to carry diving gear and Haz-Mat and heavy rescue equipment. Additionally, the NPFDD

purchased Marine 1 (M-1) a 14' 1" Quicksilver inflatable boat with a 25 horsepower outboard motor which provides a stable platform for water borne operations.

All of the training and equipment resources mentioned above provided the NPFD with a first responder awareness level rescue team. The NPFD as first responders are better able to determine if they are capable and equipped to handle the technical rescue incident at hand.

The problem that initiated this research was that the NPFD experienced numerous changes in executive personnel from April 1994 through June of 1998. This had a negative affect on the department's training curriculum and equipment purchases needed to maintain a technical rescue team. Five different appointees served as Chief of the Department during this period. The senior elected official of the community also changed with three different people serving as the Mayor of the Town of North Providence (Town). This coupled with a chronic budget deficit; (Providence Journal Bulletin, December 19, 1997) created turmoil within the NPFD. The decrease in funding caused some personnel to continue rescue training at their own expense. The Town was no longer providing the proper training or equipment necessary for fire and EMS personnel to handle technical rescue incidents that could occur. Safety for the rescuers and the victims may have become compromised.

The purpose of this research is to assess the NPFD's current technical rescue capabilities and propose recommendations to correct the deficiencies identified. The evaluative research method was used. Below is a list of research questions to be addressed.

- 1. Is the NPFD allocating sufficient funds to cover training costs and equipment purchases?**
- 2. Does the NPFD have the type of equipment necessary to conduct technical rescue operations?**

3. **Have NPFD personnel received the training required to perform technical rescue operations?**
4. **Does the NPFD conduct re-certification training to maintain skill levels?**

BACKGROUND AND SIGNIFICANCE

North Providence Fire Department

The Town of North Providence borders Providence, the capital city of Rhode Island, on the north. It covers an area of 5.8 square miles and has a resident population of approximately 32,090, as of April 1, 1990(RIEDC 1998). The community consists of numerous single-family homes along with clusters of multi-family row houses, apartment complexes and housing for elderly residents. Some light industry, shopping centers, and a number of old textile mills make up the remainder of the community. The construction types vary from type I to V, and range in age from over one hundred year old unprotected structures to modern day sprinkled high-rise buildings.

In 1998, the NPFD operates four engine companies, one ladder company, two advanced life-support rescue companies (ambulances) and one on-duty battalion chief. In addition, one special services unit, one marine unit (boat), and one pump and roll foam unit operate in tandem with other units when needed. The authorized strength of the NPFD is 101 uniformed personnel. The suppression and EMS personnel are assigned to a four platoon-rotating schedule. Minimum shift staffing is 20 members per shift.

The NPDF operates as a division of the Department of Public Safety. The Fire Chief reports directly to the Mayor who is also the Public Safety Director. The Department of Public Safety also includes the North Providence Police Department and the Division of Communications.

TECHNICAL RESCUE OPERATIONS

Fire departments across the United States have assumed a major role as primary responders to rescue incidents that involve, among other things, structural collapse, trench cave-in, confined spaces, industrial and agricultural machinery, water emergencies, and people trapped above or below grade level. These emergencies are grouped into a category of rescue called technical rescue. Technical rescue incidents are often complex; requiring specially trained personnel and special equipment to complete the mission. The safety of crews conducting technical rescue operations is of special concern. (Technical Rescue Program Development Manual, FA-159, 1995, p.i).

To date, the NPDF has dealt with some of these complex rescue situations. Each of these incidents was mitigated successfully. However, with the ever-increasing number of technical rescues, the chances of conducting a safe rescue without the proper training or equipment may decrease.

This research is part of the applied research requirements for the Executive Development course at the National Fire Academy (NFA). This research relates to the evaluative phase of the above mentioned course by collecting, examining, and evaluating data to make an assessment of the technical rescue capabilities of the NPDF.

The results of this research will have significant impact in how the NPDF develops a program to attain varying levels of training and different equipment capabilities to safely perform technical rescue

operations. This research provides facts and recommendations that will assist the Mayor and the Chief of the Department in developing a technical rescue team for the NPFD.

LITERATURE REVIEW

The research procedure began with a literature review conducted at the Learning Resource Center (LRC) on the NFA campus in January 1998. Further reviews were conducted at several local library sites that included North Providence Public Library, North Providence, Rhode Island and Phillips Memorial Library, Providence College, Providence, Rhode Island between January 1998 and May 1998. Also, during this period, the author conducted a literature review using a personal collection of fire service periodicals and publications.

National Standards and Recommendations

The literature review located several National Fire Protection Association (NFPA) standards that addressed different areas of technical rescue in the fire service. NFPA Standard Number 1500, 1997 Edition, entitled "Fire Department Occupational Safety and Health Program" located in Chapter 1-1-5, Definitions, stated

Special Operations those emergency incidents to which the fire department responds that require specific and advanced training and specialized tools and equipment. Special operations include water rescue, extrication, hazardous materials, confined space entry, high-angle rescue, aircraft rescue and fire fighting and other operations requiring specialized training (NFPA 1500, 1997, p. 8).

NFPA 1500, "Standard for Fire Department Occupational Safety and Health Program," also addresses training requirements. Chapter 3-3.1 says that " Training shall be provided for all members as often as necessary to meet the applicable requirements of this chapter, but not less than twice each year" (NFPA 1500, 1997, p. 10). Chapter 3-4.1, Special Operations, states that "Specific and advanced training and education shall be provided to members who engage in special operations." Chapter 3-4.2, addresses operating procedures "The fire department shall develop written standard operating procedures that describe the actions to be taken in situations involving special operations and shall include these standard operating procedures in the advanced training and education program " (NFPA 1500, 1997, p.11).

A review of the NPFDD Standard Operating Procedures (SOP) showed that with the exception of SOP # 17, Haz-Mat Operations (issued January 10, 1996) and SOP # 18, Marine Company Operations (issued June 3, 1996) no other SOP was issued relative to technical rescue operations. Additionally, a review of NPFDD General Orders (GO) showed that GO # 11 (issued June 20, 1997) was the only GO issued dealing with technical rescue. It defined what types of incidents to which SS-1 would respond. The NPFDD is providing very little of the NFPA recommended written guidance for technical rescue operations.

NFPA 1470, " Standard on Search and Rescue Training for Structural Collapse Incidents, 1994 Edition, Chapter 1-1.1 states that " This standard identifies and establishes levels of training for safely and effectively conducting operations at structural collapse incidents " (NFPA 1470, 1994, p.4). Further stated in chapter 3-1.1 Operational Capability that

The authority having jurisdiction shall establish the level of operational capability needed to conduct search and rescue operations at structural collapse incidents safely and effectively,

based on hazard and risk assessment, training level of personnel, and availability of internal and external resources (NFPA 1470, 1994, p. 4).

This research did not reveal any attempt by the NPFD to establish a level of operational capability needed to conduct search and rescue operations at structural collapse incidents based on a hazard and risk assessment recommended by the NFPA.

The NFPA standards provide specific guidelines for training, safety, and operational requirements for a technical rescue program. The State of Rhode Island has adapted portions of NFPA 1500 as the Safety and Health Program for fire departments. (Rhode Island General Laws Title 23 Chapter 28.4, 1990, p. 50).

The Code of Federal Regulations, Occupational Safety and Health Administration (OSHA) Title 29 - Labor, July 1997 Edition, Standard number 1910.134, provides rules and regulations regarding respiratory protection. The revised OSHA Respiratory Standard was published in the Federal Registry on January 8, 1998. It was effective as of April 8, 1998. This standard regulates operations in areas where the air may be contaminated, or atmospheres immediately dangerous to life or health (IDLH). Standard number 1910.146 regulate operations in permit-required confined spaces. These two standards provide additional guidelines for equipment and training that is necessary for technical rescue teams.

Two other publications were found that addressed the training, funding and equipment needs of a technical rescue program.

The first is The U. S. Fire Administrations, Technical Rescue Technology Assessment, FA-153, January 1995 which stated in Chapter 1

Fire departments are the primary responders to technical rescue emergencies across the country. A rescue team's training level, size and equipment affect its ability to handle and manage a technical rescue incident. Most teams are equipped to handle only the types of incidents that are most likely to occur in their area. A vast majority of the fire departments are either unprepared or under prepared to handle technical rescue emergencies (Technical Rescue Technology Assessment, FA-153, 1995, p. 1-19).

The second publication is The U. S. Fire Administrations, Technical Rescue Program Development Manual FA-159, August 1995 that states

Many fire departments and rescue agencies across the country have recognized that their baseline skills and their existing equipment are insufficient for rescue incidents that have occurred or may occur in their response areas. Some departments have formed or considered forming technical rescue teams to address these complex and hazardous situations (Technical Rescue Program Development Manual, FA-159, 1995, p. 1-1).

PROCEDURES

The literature review focused on two target areas. First, a search was executed for recognized sources that address technical rescue team training. This search was to identify nationally accepted standards or recommendations for training technical rescue teams. Secondly, a search was conducted to find what equipment is recommended for a technical rescue team. A number of questions were

asked including whether the NPFDD could meet any of the operational level requirements of technical rescue and what training is being done to achieve these levels.

Battalion Chief Kenneth Scandariato, Training and Safety Officer, of the NPFDD from September of 1994 to January of 1995 was interviewed on May 1, 1998 about the initial efforts to train personnel in Haz-Mat operations.

John Carnegis, Training and Safety Director, of the NPFDD from April 15, 1995, to April 15, 1998, was interviewed on May 10, 1998 for information on advanced training for technical rescue.

Alfred F. Bertoncini, a veteran of the Providence Fire Department, and Chief of the NPFDD from January 12, 1995 to March 12, 1997 was interviewed on May 23, 1998 for information on the efforts to equip the department for technical rescue during his tenure as chief.

An interview conducted with Bob Lee, a Captain with the La Habra, California Fire Department, on April 13, 1998 provided insight into funding, equipping and training a technical rescue team.

Lieutenant John Cagno, a ladder company officer with the NPFDD, and a member of the Federal Emergency Management Agencies (FEMA) regional Urban Search and Rescue Team (USAR), Massachusetts Task Force 1 (MATF-1) was interviewed on May 25, 1998 for information on the NPFDD'S current capabilities in technical rescue.

Lieutenant John Silva, NPFDD Haz-Mat and Safety Officer, was interviewed on May 29, 1998 for information on efforts to fund re-certification training for the department.

To aid in the research, two forms were created. Form # one, referred to as "Survey of Technical Rescue Courses Completed" (see Appendixes A-E), and was used to gather information regarding which courses had been completed by each member of the NPFDD by group.

Form # two, entitled “Recommended Equipment Lists,” (see Appendixes F-H) was designed to compare equipment the NPFD currently has on hand with the recommendations listed in the Technical Rescue Program Development Manual (FA-159, February 1996 Appendix D).

Form # one, data was entered into an Excel spreadsheet and analyzed. These results provided meaningful information relative to the research questions.

The second form was used to determine equipment shortages between the several operational levels listed, and what the department has in inventory. This information was entered into an Excel workbook, and this data was then used to answer the research questions and formulate equipment recommendations.

Information gathered with the two research forms was cross-referenced with available NPFD records.

LIMITATIONS

This research was limited by a number of factors. First, the number of different skills in the technical rescue field made it difficult to research all of them thoroughly. Due to these factors, the focus of the research was narrowed to the following areas of technical rescue, rope rescue, trench rescue, emergency building shoring, confined space, and Haz-Mat. The NPFD has had some training in these skills. The second limitation was due to numerous staffing changes. This has made researching NPFD records difficult.

RESULTS

1. Is the NPFDD allocating sufficient funds to cover training costs and equipment purchases?

According to the Technical Rescue Program Development Manual FA-159,

Funding for technical rescue teams must take into account a commitment to continually train and retrain personnel. It is not enough to initially train and equip a team; to be effective members must constantly practice their skills and learn new ones (Technical Rescue Program Development Manual, FA-159, 1995, p. 4-1).

According to the North Providence Budget Summaries (Fiscal Years 1996-1999), a trend to lower funding for most NPFDD training and equipment line items has developed. Refer to Table 1 for line item breakdown.

Table 1

North Providence Budget Summary for Fiscal Years 1996-1999			
Line Item Appropriations	FY 1996-1997 Budget	FY 1997-1998 Budget	FY 1998-1999 Budget
Safety Program & Equipment	\$ 19,350	\$ 8,750	\$ 8,750
Special Training Courses	\$ 11,300	\$ 7,600	\$ 600
New Equipment	\$ 24,590	\$ 1,000	\$ 3,000
New Equipment - Personal	\$ 31,040	\$ 19,850	\$ 12,600
New Equipment- Apparatus	\$ 7,700	\$ -	\$ 2,000
Hazardous Materials Supplies	\$ -	\$ 6,600	\$ 7,600

The line item for Safety Program and Equipment has seen a reduction of \$10,600 from the FY 1996-1997 budget with level funding for the next two budget years. Special Training Courses have also seen a reduction in funding (\$10,700) over the three-year period, with only \$600.00 in the line item for the coming FY. Most of the NPFDD training is funded from this account. The three different line items

for various types of equipment have also been reduced by a significant amount. The Hazardous Materials Supplies line item is the only account with a significant increase.

In light of these budget reductions, the funding of the NPFD is not adequate to train and equip a technical rescue team. This level of funding may have serious effects on the NPFD'S ability to perform technical rescue operations in some situations.

2. Does the NPFD have the type of equipment needed to conduct technical rescue operations?

Another common misconception many emergency service managers have is that typical fire and rescue service equipment is suited for technical rescue operations or, as it is sometimes called, the "close enough to work in a pinch" syndrome. The hazard curve paradox can give unprepared teams a false sense of security with regard to equipment (Michael G. Brown, Fire Engineering Magazine, May 1994 p., 39).

According to a comparison between the NPFD'S, inventory and that recommended in the Technical Rescue Program Development Manual, FA-159, 2/95 Appendix D. The NPFD meets most of the requirements for the first responder (awareness level) rescue team (See Appendix F). A substantial amount of the recommended equipment is possessed to operate as an operations level team (See Appendix G). Significant deficiencies in the required equipment become readily apparent in the advanced heavy rescue team comparison (See Appendix H). The amount that is below the recommended level is shown in the column titled Over/Short. Highlighted items identify inventory equipment below the recommended level. Maintaining a shortage of equipment, particularly specialized rescue equipment, will make some types of rescue situations difficult, if not impossible.

To attain an operations equipment level, a budget increase of \$4,500 is needed to purchase the necessary equipment according to the Technical Rescue Program Development Manual FA-159 August 1995, Appendix D. This increase represents less than one percent (1%) of the FY 1998-1999 NPFD budget outlay.

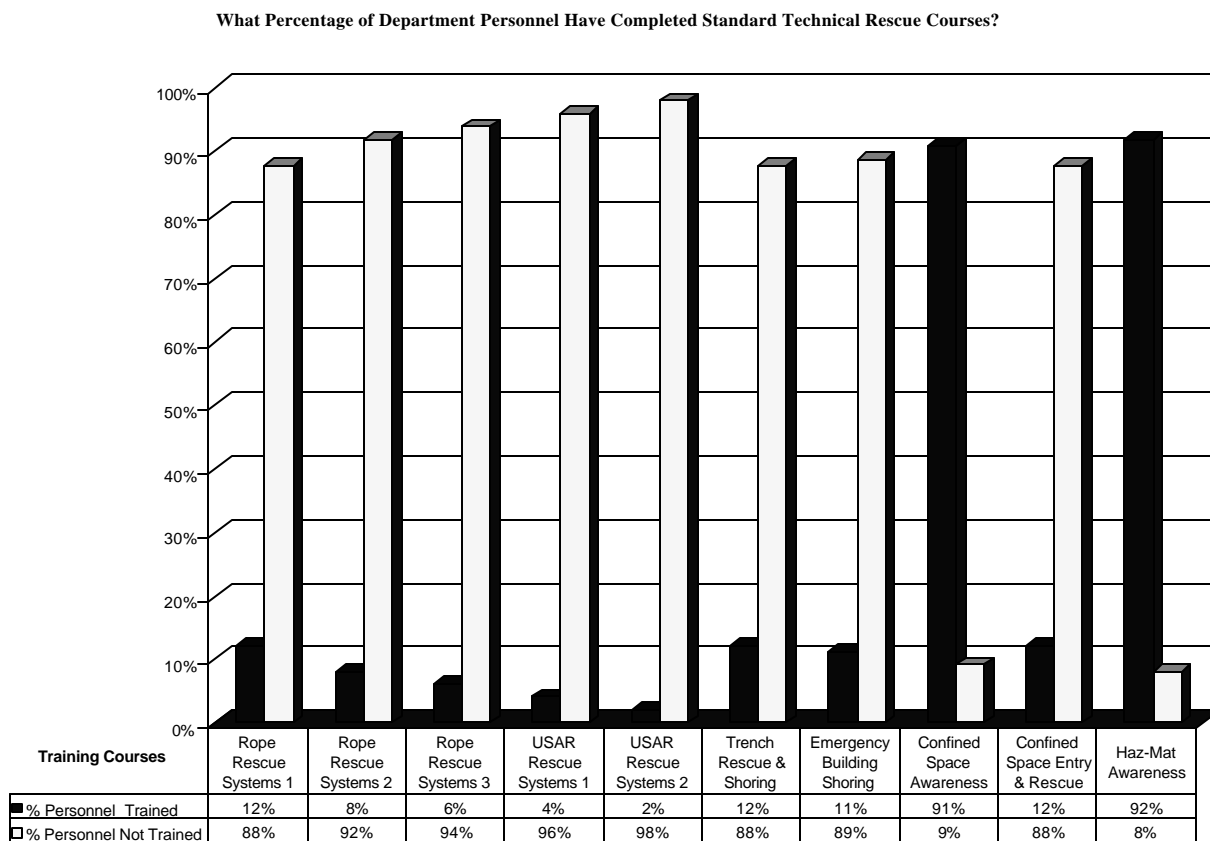
3. Have NPFD personnel received the training required to perform technical rescue operations?

Individual interviews were conducted with each member of NPFD to determine which technical rescue training courses they had successfully completed. Only those training courses that were completed at a recognized governmental or contract training agency were considered valid for this survey. Records on file in the NPFD Division of Training and original certificates issued to individual firefighters were used for verification. Figure 1 shows about 92% of personnel are trained for HAZ-MAT and Confined Space awareness levels. A number of personnel (12%) have also completed rope rescue one, a basic component of any technical rescue team. In addition, (11-12%) of the personnel have completed three of the more difficult technical rescue skills (emergency building shoring, trench rescue and shoring, and confined space entry and rescue). Smaller percentages ranging from (2-8%) have completed the rest of the recommended skills. The results by department percentages are shown in Figure 1. A sufficient number of personnel have been trained to allow for first responder (awareness) level operations only.

One problem found in this author's review is that sufficient numbers of trained personnel are not available on a shift to shift basis (see Appendixes A-E). For example, there are not enough qualified personnel to form a rescue team for confined space operations on any shift. Due to emergencies such as trench rescue requiring a quick team response, the present training levels have to be improved.

Comparing survey forms in (Appendixes A-E) one can make comparisons of capabilities between groups. An increase to the number of certified responders (4 -5 per group) would allow the formation of four technical rescue teams.

Figure 1



4. Does the NPFD conduct re-certification training to maintain skill levels?

Re-certification for technical rescue personnel is necessary to refresh practical skills and knowledge about the subject matter. In all types of technical rescue, skills must be honed and practiced to maintain a high readiness level. New technologies and new techniques are constantly being developed to make technical rescue operations easier and safer. It is important to allow for continued training beyond basic training. Teams will learn to work

together better, and an exchange of ideas and information will allow knowledge to be spread among experienced rescuers. Unlike EMS, a set number of hours may not be necessary, but an annual, skill based test in competency, with the ability to retrain in deficient areas, may be the best way to keep an individual's skills and a team's level of competence consistent (Technical Rescue Program Development Manual FA-159, August 1995, Chapter 7, p., 7-8).

Title 29 of CFR Part 1910.146, Permit-required confined spaces, states that Each member of the rescue service shall practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces (CFR 29, 1997, p. 443).

The NPFD has a number of highly motivated individuals who took it upon themselves to acquire the skills that gave the NPFD its initial capability in technical rescue. After initial certification, the personnel who obtained advanced skills in technical rescue have not been able to maintain their certification or train in realistic conditions at the local level.

Personnel who are instructors for the Rhode Island State Fire Academy, as well as personnel who are members of the regional USAR team MATF-1 have maintained their certifications. Other records indicate an ongoing effort by the individual platoons to maintain basic rope rescue skills.

A review of NPFD records indicates that the NPFD has not documented or conducted any re-certification training for the technical rescue skills assessed.

DISCUSSION

When a technical rescue emergency occurs, the public expects the responders to be able to take care of the situation. That is not always the case. Insufficient funding, lack of equipment, and little or no training can be disastrous for the would be rescuers and or the victims. However, industry and the public have come to depend on the fire service in almost any situation. There is an implied duty to act, regardless of the NPFDS capabilities.

In these times of financial constraints, budget curtailments, staffing limitations and reductions and limited resource acquisitions, the initiation of new programs or the expansion of the scope of existing services must be thoroughly assessed, properly planned and adequately developed in order to effectively implement program initiatives. Developing a technical rescue team requires a thorough understanding of the needs associated with such a team, and an appropriate planning process that will ultimately lead an agency towards its established goal of enhanced rescue capabilities (Christopher J. Naum Firehouse Magazine May 1993, p. 39).

Even smaller communities like North Providence are at some risk for a natural or manmade disaster. Due to fiscal restraints planning for the big event that may never come, is usually not a big priority. Providing effective cost efficient fire and EMS service should be the goal of every community. While most municipalities inevitably go through a period of financial difficulty, the safety of the community should not be jeopardized. Although difficult financial decisions have to be made, public safety should always be funded to the highest possible level.

"The need for specialized technical rescue capabilities must be focused and dictated by identified local risk levels or the inherent hazard potential that exists coupled with the limitations and

existing capabilities the department has for specialized technical rescue responses " (Christopher J. Naum Firehouse Magazine May 1993, p. 38).

The NPFD has identified some of the known target hazards in the community. A chemical supply company numerous jewelry-plating shops, a textile mill, and a large swimming pool supply company, all provide the potential for serious HAZ-MAT incidents. This research shows that the training needed to deal with a major incident at one of these complexes is not taking place. Although most of the NPFD has been trained to the Haz-Mat awareness and operations level, no re-certification training has been documented. Other technical rescue hazards may exist in these locations or others throughout the community.

The ability of a technical rescue team to meet the rescue needs within its community in an effective and efficient manner is dependant on three main factors: the training level of rescue team members, the number of trained rescue personnel, and the team's equipment and tools (Technical Rescue Technology Assessment, FA-153, January 1995, p. 1-1).

Technical rescue capabilities require standard equipment commonly carried on fire apparatus and specialized equipment that is not commonly carried. Most fire departments can provide basic rescue services with only a small investment in new equipment; however advanced rescue capabilities require a much larger investment. Emerging technical rescue teams should focus on mastering one area of technical rescue and acquiring the appropriate equipment necessary for this area of rescue before expanding to cover other areas. Many new teams focus on developing a rope rescue expertise first because the equipment required for rope rescue is more affordable than that required for other areas of rescue (Technical Rescue Program Development Manual FA-159, February 1996, p. 8-1).

"Alternative funding to equip technical rescue teams, with needed equipment is one approach to use. Donations from civic groups, local industry, merchants, fundraisers, anything you can think of" stated Captain Bob Lee of the La Habra, California Fire Department (personal communication, April 13, 1998). Captain Lee concluded, "Funding is not always there when you need it. Be innovative."

Alfred F. Bertoncini, former Chief of the NPFD, stated "Funding two new engines, a new rescue, M-1 and SS-1 was a major accomplishment, considering the budget restrictions. In addition, to the training sessions conducted in Haz-Mat and technical rescue enhanced the limited capability of the NPFD (personal communication May 23, 1998). Chief Bertoncini concluded that "The NPFD took some steps in the right direction, but funds for training and equipment will have to be increased to get it where it needs to be."

This research has indicated that the NPFD equipment inventory provides a solid base to build on. Spending one or two percent of the budget allocation on technical rescue equipment for several years would greatly enhance capabilities.

After the initial Haz-Mat awareness and operational level training (October 1991), there was a decline in training regarding these areas. With the exception of training for radiological monitoring, refresher training stopped. During the period of November 1994 through October 1995, the Training and Safety officer of the NPFD, Kenneth Scandariato began a Haz-mat training program that culminated in a large-scale drill on October 22, 1995. This was a major training effort in both Haz-mat awareness and operations levels (personnel communication, May 1, 1998). Chief Scandariato stated "Very little Haz-Mat training has been documented since this drill."

John Carnegis, Training and Safety Director, of the NPFD conducted three joint drills on 18 through 21, April, 1996 with the heavy rescue unit of the Providence Fire Department, Special Hazards

1. Director Carnegis stated "This exercise provided some personnel with their first training in technical rescue, other than Haz-mat. It provided hands on training with heavy equipment, in a realistic environment. This was the most comprehensive, as well as the only documented drill the NPFD had in house, involving heavy aspects of technical rescue" (personal communication, May 10, 1998).

Training, similar to the joint drill mentioned above, has to be frequent enough to maintain basic skills. Rope rigging, knots, and anchor systems are skills that are forgotten if not practiced often. The NFPA standards call for all personnel performing special operations or technical rescue to train in their respective discipline at least twice a year. Furthermore, the Code of Federal Regulations calls for all rescue entry personnel operating at confined spaces to train making actual entries at least once a year. Only those department members who train with other agencies are maintaining their skill levels.

Training funds have been reduced the last three years. Equipment purchases have been limited to absolute essentials. Finding money to pay for re-certification training is absolutely essential to maintain the limited capability, we have acquired so far (J. Silva personal communication, May 29, 1998).

We have the basics covered. With a little more training and a few more pieces of equipment, the NPFD will be at the operational level. Compared to some other area departments we are way ahead (J. Cagno personal communication, May 25, 1998).

The North Providence Fire Department has acquired a level of competency in the area of rope rescue, in both equipment and training. Trench rescue, building shoring, and confined space entry and rescue are also strong points, training wise. This could be the building block to a team with multiple capabilities. Two department personnel (2%) are members of the regional FEMA USAR team MATF-1 and several others have pending applications. Both team members are certified instructors in some

phases of technical rescue. These NPFD resources could be tapped to provide some of the training this research has shown is not being provided.

Enlightened fire and rescue service managers realize how "special" people, "special" training, and "special" equipment work together to improve the chances of survival for rescuers and victims in technical rescue operations (rope, confined space, trench, swift water, cave, and structural collapse, among others). (Michael G. Brown, Fire Engineering, May 1994, p. 39).

In summary, the research has shown that NPFD has the necessary equipment to provide the first responder (awareness) level capability in the technical rescue areas. With a minimal equipment funding increase, the next operational level could be attained (Technical Rescue Program Development Manual, 1995, Appendix D). Capabilities have fluctuated up and down due to changes in executive management decisions and lack of funding. This research indicates that there are sufficient personnel trained to form a first responder (awareness) level rescue team. Shortcomings in recommended annual training requirements and re-certification could result in the compromise of firefighter safety (NFPA 1500, 1997, p. 11).

RECOMMENDATIONS

Interim Measures:

- 1) Develop a rapid recall list to call back personnel certified in technical rescue
- 2) Using available internal and external resources, institute a refresher-training program within the next three to nine months to re-certify personnel
- 3) Develop a mutual aid pact with surrounding communities for technical rescue needs

Long term Measures:

- 4) Conduct a community based risk assessment to identify target hazards which are most likely to require technical rescue skills to mitigate incidents at their facilities
- 5) Decide which level of capability the department needs to operate at based on the community risk assessment
- 6) Identify personnel who are interested in training to perform technical rescue operations
- 7) Form a Special Operations Branch, with emphasis on the following areas:
Haz-Mat, Technical Rescue, and Marine Operations.
- 8) Fund training to the level needed to maintain proficiency according to nationally accepted standards
- 9) Develop written technical rescue Operating Guidelines or Standard Operating Procedures
- 10) Check for compliance with Federal and State regulatory agencies
- 11) Look at alternative funding to finance needed equipment
- 12) Form a technical rescue team with surrounding departments

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Appendix A

Survey of Technical Rescue Courses Completed										
A Group	Rope Rescue Systems 1	Rope Rescue Systems 2	Rope Rescue Systems 3	USAR Resue Systems 1	USAR Rescue Systems 2	Trench Rescue & Shoring	Emergency Building Shoring	Confined Space Awareness	Confined Space Entry & Rescue	Haz-Mat Awareness
A. Zarlenga	0	0	0	0	0	0	0	1	0	1
J. Carnegis	1	1	0	1	0	0	1	1	1	1
D. Milson	0	0	0	0	0	0	0	1	0	1
F. Andre	0	0	0	0	0	0	0	1	0	1
J. Sylvester	0	0	0	0	0	0	0	1	0	1
R. Parenteau	0	0	0	0	0	0	0	1	0	1
S. Bishop	0	0	0	0	0	0	0	1	0	1
D. Charello	0	0	0	0	0	0	0	1	0	1
L. Gardner	0	0	0	0	0	0	0	1	0	1
G. Grande	0	0	0	0	0	0	0	1	0	1
J. Casalino	0	0	0	0	0	0	0	1	0	1
N. Annicelli	0	0	0	0	0	0	0	1	0	1
D. DiChiara	0	0	0	0	0	0	0	1	0	1
E. DiGiulio, Jr.	1	1	1	0	0	1	1	1	1	1
F. Vescera	1	1	1	1	0	1	1	1	1	1
P. Labbadia	1	1	1	0	0	1	1	1	1	1
J. Gregson	0	0	0	0	0	0	0	1	0	1
G. St. Jean	0	0	0	0	0	0	0	1	0	1
J. Notarantonio	0	0	0	0	0	0	0	1	0	1
R. Lawson	0	0	0	0	0	0	0	1	0	1
M. Adams	0	0	0	0	0	0	0	1	0	1
D. LeGault	0	0	0	0	0	0	0	1	0	1
Key :										
Enter a "0" in box for not completed										
Enter a "1" in box for completed										
Totals:										
Not Completed	18	18	19	20	22	19	18	0	18	0
Completed	4	4	3	2	0	3	4	22	4	22

Appendix B

Survey of Technical Rescue Courses Completed										
<i>B Group</i>	<i>Rope Rescue Systems 1</i>	<i>Rope Rescue Systems 2</i>	<i>Rope Rescue Systems 3</i>	<i>USAR Rescue Systems 1</i>	<i>USAR Rescue Systems 2</i>	<i>Trench Rescue & Shoring</i>	<i>Emergency Building Shoring</i>	<i>Confined Space Awareness</i>	<i>Confined Space Entry & Rescue</i>	<i>Haz-Mat Awareness</i>
D. Clark	0	0	0	0	0	0	0	1	0	1
S. Marwell	0	0	0	0	0	0	0	1	0	1
D. Dilorio	0	0	0	0	0	0	0	1	0	1
L. Charello	0	0	0	0	0	0	0	1	0	1
W. Roy	0	0	0	0	0	0	0	1	0	1
E. Bazzle	0	0	0	0	0	0	0	1	0	1
D. Gallagher	0	0	0	0	0	0	0	0	0	0
B. Zarlenga	0	0	0	0	0	0	0	1	0	1
W. Morrissey	0	0	0	0	0	0	0	1	0	1
J. Horan	0	0	0	0	0	0	0	0	0	1
R. Baptista	0	0	0	0	0	0	0	1	0	1
A. Anderson	0	0	0	0	0	0	0	1	0	1
L. Iavarone	0	0	0	0	0	0	0	1	0	1
S. Catanzaro	0	0	0	0	0	0	0	1	0	1
W. Calabro	1	0	0	0	0	1	1	1	1	1
D. Scott	1	1	1	0	0	1	1	1	1	1
S. Landolfi	0	0	0	0	0	0	0	1	0	1
W. Scullion	0	0	0	0	0	0	0	1	0	1
A. Rossi	0	0	0	0	0	0	0	1	0	1
W. Levesque	0	0	0	0	0	0	0	1	0	1
S. Corio	0	0	0	0	0	0	0	1	0	1
M. Demello	0	0	0	0	0	0	0	1	0	1
Key :										
Enter a "0" in box for not completed										
Enter a "1" in box for completed										
Totals:										
Not Completed	20	21	21	22	22	20	20	2	20	1
Completed	2	1	1	0	0	2	2	20	2	21

Appendix C

Survey of Technical Rescue Courses Completed										
C Group	Rope Rescue Systems 1	Rope Rescue Systems 2	Rope Rescue Systems 3	USAR Rescue Systems 1	USAR Rescue Systems 2	Trench Rescue & Shoring	Emergency Building Shoring	Confined Space Awareness	Confined Space Entry & Rescue	Haz-Mat Awareness
K. Scandariato	0	0	0	0	0	1	1	1	1	1
M. Russo	1	1	1	0	0	1	1	1	1	1
J. Wheeler	0	0	0	0	0	1	0	1	0	1
J. Grande	0	0	0	0	0	0	0	1	0	1
G. Unsworth	0	0	0	0	0	0	0	1	0	1
M. Petracca	0	0	0	0	0	0	0	1	0	1
R. Morrissey	0	0	0	0	0	0	0	1	0	1
D. Giammarco	0	0	0	0	0	0	0	1	0	1
S. Bifulco	0	0	0	0	0	0	0	1	0	1
D. Singleton	0	0	0	0	0	0	0	1	0	1
P. Zaccagnini	0	0	0	0	0	0	0	1	0	1
J. McNeil	0	0	0	0	0	0	0	1	0	1
J. Sylvester	0	0	0	0	0	0	0	1	0	1
D. Cesana	0	0	0	0	0	0	0	1	0	1
J. Pacia	0	0	0	0	0	0	0	1	0	1
D. DeStefano	0	0	0	0	0	1	0	1	1	1
D. Usenia	0	0	0	0	0	0	0	1	0	1
R. Renzi	0	0	0	0	0	0	0	1	0	1
A. Peterson	0	0	0	0	0	0	0	1	0	1
J. Centracchio	0	0	0	0	0	0	0	1	0	1
J. Petrillo	0	0	0	0	0	0	0	1	0	1
R. Hall	0	0	0	0	0	0	0	1	0	1
R. Arcand	0	0	0	0	0	0	0	0	0	0
Key:										
Enter a "0" in box for not completed										
Enter a "1" in box for completed										
Totals:										
Not Completed	22	22	22	23	23	19	21	1	20	1
Completed	1	1	1	0	0	4	2	22	3	22

Appendix D

Survey of Technical Rescue Courses Completed										
<i>D Group</i>	<i>Rope Rescue Systems 1</i>	<i>Rope Rescue Systems 2</i>	<i>Rope Rescue Systems 3</i>	<i>USAR Rescue Systems 1</i>	<i>USAR Rescue Systems 2</i>	<i>Trench Rescue & Shoring</i>	<i>Emergency Building Shoring</i>	<i>Confined Space Awareness</i>	<i>Confined Space Entry & Rescue</i>	<i>Haz-Mat Awareness</i>
J. Lane, Jr.	0	0	0	1	1	1	1	1	1	1
G. Capaldi	0	0	0	0	0	0	0	1	0	1
M. DeResta	0	0	0	0	0	0	0	1	0	1
R. Bell	1	0	0	0	0	0	0	1	0	1
J. McKenna	0	0	0	0	0	0	0	1	0	1
K. Erickson	0	0	0	0	0	0	0	1	0	1
S. Horan	0	0	0	0	0	0	0	1	0	1
S. L'Heureux	0	0	0	0	0	0	0	1	0	1
D. Torregrossa	0	0	0	0	0	0	0	1	0	1
D. Randall	0	0	0	0	0	0	0	1	0	1
L. Albanese	0	0	0	0	0	0	0	1	0	1
J. Bomba	0	0	0	0	0	0	0	1	0	1
A. Ceprano	0	0	0	0	0	0	0	1	0	1
J. Cagno	1	1	1	1	1	1	1	1	1	1
J. Laurie	1	0	0	0	0	0	0	1	0	1
A. Noonan	0	0	0	0	0	0	0	1	0	1
R. Medieros	1	1	0	0	0	0	0	1	0	1
H. Cullen	0	0	0	0	0	0	0	1	0	1
R. Cardin	0	0	0	0	0	0	0	1	0	1
K. Clark	0	0	0	0	0	0	0	1	0	1
A. Cardoso	0	0	0	0	0	0	0	1	0	1
J. Hendrickson	0	0	0	0	0	0	0	1	0	1
Key :										
Enter a "0" in box for not completed										
Enter a "1" in box for completed										
Totals:										
Not Completed	18	20	21	20	20	20	20	0	20	0
Completed	4	2	1	2	2	2	2	22	2	22

Appendix E

Survey of Technical Rescue Courses Completed										
Headquarters Staff	Rope Rescue Systems 1	Rope Rescue Systems 2	Rope Rescue Systems 3	USAR Rescue Systems 1	USAR Rescue Systems 2	Trench Rescue & Shoring	Emergency Building Shoring	Confined Space Awareness	Confined Space Entry & Rescue	Haz-Mat Awareness
J. Silva	1	0	0	0	0	1	1	1	1	1
D. DiNoble	0	0	0	0	0	0	0	0	0	1
D. Vartian	0	0	0	0	0	0	0	1	0	0
T. DeAngelis	0	0	0	0	0	0	0	0	0	0
J. Vaillancourt	0	0	0	0	0	0	0	0	0	0
D. Broccoli	0	0	0	0	0	0	0	0	0	0
R.Souza	0	0	0	0	0	0	0	1	0	1
D. Salvaggio	0	0	0	0	0	0	0	0	0	0
T. Russo	0	0	0	0	0	0	0	0	0	0
Key :										
Enter a "0" in box for not completed										
Enter a "1" in box for completed										
Totals:										
Not Completed	8	9	9	9	9	8	8	6	8	6
Completed	1	0	0	0	0	1	1	3	1	3

Appendix F

Equipment Comparison List For First Responder(Awareness Level)Rescue Team			
Items	Quantity Recommended	Quantity On Hand	Over/Short
Axe, flat head	2	2	0
Axe, pick head	2	2	0
Banner guard line tape, "Fireline" roll	2	2	0
Body Bags	2	0	-2
Bolt cutter, 18"	1	1	0
Carabiners, large, steel locking "D"	4	4	0
Cord, electric, 200 ft. w/plugs/adapters	1	1	0
Crow bar, 24"	1	1	0
Decenders with ears, large steel	4	4	0
Electrical testing device(amprobe, volt/OHM meter)	1	1	0
Extinguisher, CO2	1	1	0
Extinguisher, dry chemical	1	1	0
Extinguisher, pressurized water, 2 1/2 gallon	1	1	0
First aid kit	1	1	0
Generator, gas powered, 5000W	1	1	0
Goggles, safety	4	4	0
Hacksaw, carbide blade	1	1	0
Halligan tool	1	1	0
Hammer, carpenter, 22 oz.	2	2	0
Handlight, battery operated	4	4	0
Hearing protection headsets	4	0	-4
Key tool, gas utility	1	1	0
Key tool, water utility	1	1	0
K-tool, lock, removal device	1	1	0
Ladder, attic, 10 foot	1	1	0
Ladder, extension, 24 foot	1	1	0
Ladder, roof, 14 foot	1	1	0
Latex gloves, 1 box	1	1	0
Light, circle D, 500 W	2	2	0
Mallet, rubber	1	1	0
Masks, dust, 1 box	1	1	0
Oxygen/suction unit, portable	1	1	0
Personal alert device(PASS)	4	4	0
Pike pole, 6 foot	1	1	0
Pipe wrench, 18"	1	1	0
Pry bar	1	1	0
Rope lifeline, 150 foot, 12.7MM static Kernmantle(with bags)	2	2	0
Rope, utility, 100 foot, 1/2"	1	1	0
Salvage cover, 12x18	1	1	0
Self contained breathing apparatus(SCBA)	4	4	0
Shovel, dirt, round point	2	2	0

Equipment Comparison List For First Responder(Awareness Level)Rescue Team			
Items	Quantity Recommended	Quantity On Hand	Over/Short
Smoke ejector, electric, 16inch	1	1	0
Tool box and small mechanic's tool set	1	1	0
Webbing, tubular, 2" wide, 20 foot length	4	4	0
Wheel chock, metal(fulcrum/crib)	2	2	0

Appendix G

Equipment Comparison List For Operations Level Rescue Team			
Items	Quantity Recommended	Quantity On Hand	Over/Short
Atmospheric monitor(Gas Trac, MSA Explosion Meter)	1	1	0
Axe, flat head	2	2	0
Axe, pick head	2	2	0
Axe, pry	1	1	0
Axe-crash	1	0	-1
Backboard	1	1	0
Banner guard line tape, "Fireline" roll	2	2	0
Bar, chin-up for smoke ejectors	2	0	-2
Blower, gasoline powered, 20 inch	1	0	-1
Body Bags	2	0	-2
Bolt cutter, 18"	1	1	0
Bolt cutters, 36"	1	1	0
Broom, street	1	1	0
Carabiners, large, steel locking "D"	4	4	0
Chain saw, gasoline powered, 16"	1	1	0
Chain saw, gasoline powered, 24"	1	1	0
Circular saw, gasoline powered, 16" w/carbid, metal and masonry blades	2	2	0
Circular skillsaw, electric	1	1	0
Closet hook	1	1	0
Cord, electric, 200 foot w/plugs/adapters	1	1	0
Crow bar, 24"	1	1	0
Crow bar, 36" carpenter	2	2	2
Debris bag	2	0	-2
Decenders with ears, large steel	4	4	0
Electrical testing device(amprobe, volt/OHM meter)	1	1	0
Extinguisher, CO2	1	1	0
Extinguisher, dry chemical	1	1	0
Extinguisher, pressurized water, 2 1/2 gallon	1	1	0
First aid kit	1	1	0
Gas cans(gasoline and gas/oil mix)	2	2	0
Generator, gas powered, 7500W or greater	1	1	0
Goggles, safety	4	4	0
Hacksaw, carbide blade	1	1	0
Halligan tool	1	1	0
Hammer, carpenter, 22 oz.	2	2	0
Handlight, battery operated	4	4	0
Handsaw, cross cut	1	1	0
Harness cable set for Stokes	1	1	0
Hearing protection headsets	4	0	-4

Equipment Comparison List For Operations Level Rescue Team			
Items	Quantity Recommended	Quantity On Hand	Over/Short
Key tool, gas utility	1	1	0
Key tool, water utility	1	1	0
K-tool, lock, removal device	1	1	0
Ladder, attic, 10 foot	1	1	0
Ladder, extension, 28 foot	2	2	0
Ladder, extension, 35 foot	2	2	0
Ladder, folding, Little Giant	1	1	0
Ladder, roof, 14 foot	1	1	0
Latex gloves, 1 box	1	1	0
Life belts	4	4	0
Light, circle D, 500 W	2	2	0
Line throwing gun, with accessories	1	0	-1
Mallet, rubber	1	1	0
Masks, dust, 1 box	1	1	0
Oxygen/suction unit, portable	1	1	0
Personal alert device(PASS)	4	4	0
Pike pool, 10 foot	1	1	0
Pike pool, 12 foot	1	1	0
Pike pool, 14 foot	1	1	0
Pike pool, 16 foot	1	1	0
Pipe wrench, 18"	1	1	0
Pitch forks	2	2	0
Poling tool, elevator	1	0	-1
Porto-power hydraulic tool, 4 ton	1	1	0
Pry bar	1	1	0
Rabbit hydraulic forcible entry tool	1	1	0
Reciprocating saw, electric	1	1	0
Reeves stretcher	1	0	-1
Respirator, full face w/HEPA filters	4	0	-4
Rope lifeline, 150 foot, 12.7MM static Kernmantle(with bags)	2	2	0
Rope, utility, 100 foot, 1/2"	1	1	0
Salvage cover, 12 x18	1	1	0
Salvage cover, 14 x18	2	2	0
SCBA bottles, extra	4	4	0
Self contained breathing apparatus(SCBA)	4	4	0
Shovel, dirt, round point	2	2	0
Shovel, scoop	2	2	0
SKED Stretcher	1	0	-1
Sledge hammer, 12 lb., long handle	2	2	0

Equipment Comparison List For Operations Level Rescue Team			
Items	Quantity Recommended	Quantity On Hand	Over/Short
Sledge hammer, 8 lb., short handle	2	2	0
Stokes basket	1	1	0
Tag lines, 100 foot	2	2	0
Tape, duct, roll	4	4	0
Tool box and small mechanic's tool set	1	1	0
Webbing, tubular, 2" wide, 20 foot length	4	4	0
Wheel chock, metal(fulcrum/crib)	2	2	0

Appendix H

Equipment Comparison List For Advanced Heavy Rescue Team			
Items	Quantity Recommended	Quantity On Hand	Over/Short
Air bag, high pressure regulator/control valve kit	1	1	0
Air bag, high pressure, 136 ton set, includes 1 ton bag, 3 ton bag, 5 ton bag, 12 ton bag, 17 ton bag, 22 ton bag, 32 ton bag, and 44 ton bag	8	7	-1
Air bag, low pressure, small, medium and large	1	0	-1
Air chisel w/blades	1	1	0
Air compressor, vehicle-mounted	1	0	-1
Air hose/reel, 100 foot	1	0	-1
Ascender, aluminum, 1/2"	4	4	0
Atmospheric monitor, Explosion meter	1	1	0
Atmospheric monitor, gas detector	1	1	0
Atmospheric monitor, oxygen analyzer-type, personal	1	1	0
Bolt cutter, 24"	1	1	0
Bolt cutter, 36"	1	1	0
Carabiner, large steel, locking "D"	24	24	0
Carpet squares	10	0	-10
Chain, grade 7, 3/8", 20' w/hooks	2	2	0
Chocks, step-type	4	0	-4
Come-along, 1 ton	1	1	0
Come-along, 4 ton	1	1	0
Cord, electric, 12G, 600' three-wire grounded(various lengths), w/adapters	1	1	0
Cord, prusik, 8MM, 200'	1	1	0
Cribbing, 2"x4"x2 ft.	30	15	-15
Cribbing, 4"x4"x3 ft.	20	10	-10
Cut-off tool, pneumatic(wizzer saw)	1	1	0
Cutting torch set, oxy-acetylene	1	1	0
Daisy chain, 5'	2	2	0
Descender, w/ears, large, steel	12	12	0
Drill, 1/2 electric	1	1	0
Drill/driver, "_", cordless	1	0	-1
Edge frame(portable for rope raising operations)	1	0	-1
Edge roller	2	2	0
Etier(3 and 4 step)	2	0	-2
Exothermic cutting torch(Arcair, etc.)w/accessories	1	1	0
Forcible entry ram, sliding, kit	1	1	0
Gas can(gasoline and gas/oil mix)	2	2	0
Generator, 20KW or greater, vehicle mounted	1	0	-1
Hailing device, battery operated(bullhorn)	1	0	-1

Equipment Comparison List For Advanced Heavy Rescue Team			
Items	Quantity Recommended	Quantity On Hand	Over/Short
Hand winch for tripod, w/100ft. cable	1	0	-1
Harness, class III	2	2	0
Harness, personal, class II	4	4	0
Head lamps, low voltage, intrinsically safe	4	0	-4
Hydraulic spreader/jaws/cutter, multi-purpose(Hurst type)	1	1	0
Hydraulic tool power unit(Hurst-type)w/hoses and accessories	1	1	0
Impact wrench, pneumatic	1	0	-1
Index set, drill bits	1	0	-1
Jack, hydraulic, 20 ton, bottle type	2	1	-1
Jack, Hi-Lift, 48"	2	0	-2
Jack, hydraulic, 10 ton, bottle type	2	1	-1
Jack-o-latens(cord reel/light set)	2	2	0
Jimmi Jack stabilization system w/2 short and 2 long stabilizers and accessories	1	0	-1
Junction boxes, electric	4	4	0
Lights, Circle D or 500 W halogens	4	4	0
Line throwing gun w/accessories	1	0	-1
Nail/fastener gun w/accessories, charges, fastners, nails(Hilti, Paslode, etc.)	1	0	-1
Oxygen manifold "Mutilator" w/O2 bottles	1	0	-1
Personal atmospheric monitors(Industrial Scientific HMX-271 type)	2	0	-2
Pneumatic airgun breaker tool	1	1	0
Porto-power tool kit, 10-ton	1	1	0
Post hole digger	1	0	-1
Prusik, long	6	6	0
Prusik, short	6	6	0
Pulley, double, 2"x1/2"	2	0	-2
Pulley, single	10	4	-6
Pulley, single, 2"x1/2"	4	2	-2
Rams(short, long)	2	2	0
Respirator cartridges(asbestos rated)	24	0	-24
Respirators, full face w/cartridge attachments	6	0	-6
Rope, 12.7MM Kernmantle, 300 foot, static	1	1	0
Rope, lifeline, 150 foot, 12.5MM Kernmantle, static w/bags	4	4	0
Saw, chain, 14" electric	2	2	0
Saw, chain, 16", gasoline, w/carbide chain	2	2	0
Saw, reciprocating, electric	2	1	-1
Saw, rotary disk 16"	2	1	-1
Saw, worm drive, 7 1/4"	1	0	-1

Equipment Comparison List For Advanced Heavy Rescue Team			
Items	Quantity Recommended	Quantity On Hand	Over/Short
Saw, worm gear	1	0	-1
SCBA bottle, extra	6	6	0
Self containing breathing apparatus(SCBA)	6	6	0
Sheave, cable 4"	4	0	-4
Stakes, steel	6	0	-6
Stetcher, SKED type	1	0	-1
Supplied air breathing system w/manifold, regulator, 600' air line, 2 face pieces, escape bottles, and accessories(one system supplies two entry personnel)	2	0	-2
Tripod, 8'	1	0	-1
Tripod/light stands, telescoping	4	2	-2
Ventilation blower, electric, utility-type, w/15' tubing	1	0	-1
Webbing, 2", 20 ft.	3	3	0
Webbing, 2", 30"	2	2	0
Wedges, 4"x4"x2 ft.	20	10	-10
Whistles	4	0	-4
Winch, electric, 4 ton, vehicle mounted	1	0	-1